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FOR US LETTERS PATENT ON RETROFIT KIT FOR MOTORIZING A COLLAPSIBLE MINI SCOOTER

Drawing #'s 15 pages

RETROFIT KIT FOR MOTORIZING A COLLAPSIBLE MINI SCOOTER

The present invention claims the priority date of a prior filed provisional patent application having serial # 60-240548, and official filing date of October 12, 2000, and which discloses substantial similar matter as described herein.

Field of invention

The present invention is directed to a collapsible motorized mini scooter, a retrofit motorized unit in kit form for a mini scooter.

Background of the Invention

During the past few years, the lightweight collapsible mini scooter has become very popular in the market place. The scooter is very durable and very compact when folded up. The steering tube can be collapsed; handle grips folded and unit can be placed in a bag and carried over one's shoulder. Children, teenagers and some adults use the mini scooter today. A motorized unit for these existing scooters would be a great added value and enjoyment for existing scooter owners, as long as it comes in a kit form and easy to install with minimum skills and equipment.

Summary of Invention

The invention is embodied in a kit form converting a non-motorized mini scooter into a motorized scooter which does not damage the original scooter construction by drilling, machining or breaking any of the scooters original parts. The kit will provide all the components to convert and motorize the mini scooter: Motor, batteries, charging system and hardware for installation.

Power to the motor will begin when rider engages forward motion, which sends current to a relay, which in turn sends current to motor, and directs forward motion. When the rider releases the switch, the current is discontinued. The drive is engaged by a positive lock lever or thumbscrew mounted with the motor bracket, battery pack NiCad and required relay are in cavity located underneath footrest platform. Motor bracket is placed where existing fender is located by replacing fender with bracket and motor. In turn fender is then placed on motor bracket. Motor is activated by button switch on handle bar and ground current to relay is sent through rotating contact shoe on adjustable handle bar tube, or optional remote system on some units are provided which use a transmitter on the handles grips and an additional receiver located in the battery cavity, and a cam lock motor bracket adjuster is used as well as a foot lock motor adjuster. The forward motion is obtained by a small spindle located on electric motor shaft, which comes in contact with the rear wheel.

Brief Description of the Drawings

Fig. 1 is a side view of motorized kit installed on razor type mini scooter.

Fig. 2 is the lower cavity for battery storage rotating cup and battery tray.

Fig. 3 is present invention retrofit kit contents, battery tray, isolator ring, contact shoe, and motor bracket thumbscrew.

Fig. 4 is the motor bracket with thumbscrew and pivot pin.

Fig. 5 is the adjusting pivot pin

Fig. 6 activating foot brake

Fig. 7 activating foot brake

Fig. 8 represents clip on retrofit rotating contact shoe.

Fig. 9 represents the pre-production motor bracket.

Fig. 10 represents the motor bracket with different fender options.

Fig. 11 represents the rotating contact collar.

Fig. 12 represents scooter foot platform

Fig. 13 represents spring instead of thumbscrew

Fig. 14 represents complete kit in box form for consumer purchase.

Fig. 15 represents butterfly bracket with motor and isolator collar, start stop, charger, spring installer tool, pin tool, wiring system and battery tray.

Detailed Description of the Invention

While the present invention is susceptible of embodiment in various forms, there is shown in the drawings and will hereinafter be described the presently preferred embodiments of the invention with the understanding that the present disclosures is to be considered as an exemplification of the invention and it is not intended to limit the invention to the specific embodiments illustrated.

The invention is embodied in a kit for converting a non-motorized scooter into a motorized scooter which does not damage the original scooter's construction by drilling, machining or breaking any of the scooter's original parts. Referring to Fig. 1 and 2, a non-motorized scooter 1 for use with the kit 51 of the present invention includes a base platform 3 which is stepped upon by the rider when the scooter 1 is in use. The scooter 1 also includes a head tube 15, which attaches to the front of the base platform 3 by a hinge assembly 21. The hinge assembly 21 permits the head tube 15 to rotate approximately 90 degrees from a reclined position for storage, to an extended position for use. The hinge assembly 21 preferably includes a hinge lock 23 for locking the head tube 15 in either a reclined or extended position. Telescoping through the head tube 15 is a steering column 7 including an upper tube 9 and lower tube 11. The steering column 7 is rotably attached to the head tube 15 using bearings 17, which are mounted to the top and bottom interior of the head tube 15. Preferably, the upper tube 9 is slidably telescopic within lower tube 11 and can be locked in various vertical position using a clamp lock 19. At the top of the steering column 7 are horizontally extending handlebars 5 which enable the rider to rotate

the steering column 7 by manual rotation of the handlebars 5. Affixed at the bottom of the steering column 7 is a front fork 25. Rotably mounted by a front axle 29 to the front fork 25 is a front wheel 27.

At the rear of the scooter 1 is a rear fork 31, which extends rearwardly from the rear of the base platform 3. The rear fork 31 is applied to a laterally extending rear axle 35, which rotably mounts the scooter's rear wheel 33. Preferably, the scooter 1 also includes a rear fender foot break 37. The fender foot break 37 is hingably attached to the front of the rear fork 31 by a pin, or a screw and nut combination, which extends laterally through two holes 41 formed in the rear fork 31 and two corresponding holes formed at the front of the fender foot break 37. The fender foot break 37 is biased upwardly by a spring 39. In use, a rider of the scooter 1 depresses the fender foot break 37 against the rear wheel 33 to inhibit the wheel's rotation and cause braking of the scooter 1.

The scooter 1 of the prior art provides a lightweight collapsible structure, which is driven by a user by a push-and-go method in which a rider uses one of his feet to propel the scooter which is ridden by balancing on the rider's other foot. Referring to all of the figures, and particularly Fig. 3, the kit 51 of the present invention is directed to converting the non-motorized scooter of the prior art into a motorized structure. The kit 51 includes a bracket 53 (best shown in Fig. 9), a motor 59 and an additional fender foot break 63 already affixed to the bracket 53. Referring to Fig. 9, to this end, the bracket 53 includes a pair of top holes 57 for hingably affixing the fender foot break 63 using a pivot pin passing through the top holes 57 and corresponding holes formed at the front

extremity of the fender foot break 63. Meanwhile, the motor 59 is affixed to the bracket 53 using typical fasteners at motor mount holes 60.

In a preferred embodiment, the kit 51 for converting the scooter 1 into a motorized scooter includes a low torque motor having a twenty-seven winding, single strand armature. For a preferred embodiment for creating a high performance scooter, the motor 59 includes a fourteen winding, three strand armature. The motor 59 also preferably includes internal bearings for withstanding forces imparted upon the motor's spindle 61. Suitable motors are available from Mabuchi Motor in Japan.

The kit 51 of the present invention also includes a battery pack 71 including a plurality of batteries 75 for providing electrical power to the motor. In a first preferred construction, the battery pack 71 includes twelve 1.2 volt rechargeable batteries. The batteries are wired to provide two sets of six 1.2 volt batteries wired in series, with each set of six batteries wired parallel to provide a battery pack 71 providing 7.2 volts. In a second preferred embodiment, the battery pack 71 includes fourteen 1.2 volt rechargeable batteries for providing additional torque. The batteries are wired to provide two sets of seven 1.2 volt batteries wired in series, with each set of seven batteries wired in parallel to provide a battery pack providing 8.4 volts. Providing protection for the battery pack 71 is a battery tray 73 which is affixed to the scooter 1 using Velcro attachment 77 or the like.

The battery pack 71 is connected to the motor 59 using relative high current wires 84 which extend from both the battery pack 71 and motor 59 and are connected using male and female connectors 79 and 81. The flow of current from the battery pack 71 to the motor 59 is controlled using a control circuit 85 which includes a high current relay 83 controlled by a switch constructed as an on/off button 99. Numerous suitable relays are available to those skilled in the art. However, a twelve-volt relay typically used to control the headlamps of automobiles have been found to be particularly acceptable. The on/off button 99 is connected to the relay 83 through a pair of signal wires 87 and 89, which are, in-turn, connected by a contact strip 91 and contact with the contact strip 91 by a circular collar 105.

The kit 51 of the present invention preferably includes a numerous minor attachments means for attaching the signal wires 87 and 89 to the scooter 1 such as cable ties 103 or mounting bases 101 having an adhesive backing. The above-described kit 51 provides all of the components necessary for transforming a typical prior art non-motorized scooter into a motorized scooter, which can be installed in only a few minutes using only a hammer and a screwdriver, the assembly of which will not damage the original scooter in any way.

Again with reference to all of the figures, to convert the non-motorized scooter into a motorized construction, the original fender foot break is removed by removing the preexisting pivot pin 43. In place of the preexisting fender foot break, the bracket 53 is affixed to the scooter's rear fork 31 using pivot pin 43 which is threaded through the

holes in the rear fork 31 and the bottom holes 55 formed in the bracket 53. With reference to Figs. 4, 5, 6 and 7, the bracket 53 is hingably attached to the scooter's rear fork 31 with the pin 43 so that clockwise rotation of the thumb screw 67 against the base platform 3 causes the bracket 53 to rotate rearwardly, which in-turn causes the motor's spindle 61 to engage the external surface of the scooter's rear wheel 33. Thus, activation of the motor 59 causes the rear wheel 33 to rotate. Conversely, counter-clockwise rotation of the thumbscrew 67 causes the force of the motor spindle 61 against the surface of the rear wheel 33 to be reduced enabling the rider of the scooter 1 to operate the scooter 1 in a non-motorized mode. As illustrated in Fig. 13, in an additional embodiment, instead of using a thumbscrew 67, a spring is used to bias the bracket 53 and motor 59 rearwardly against the scooter's rear wheel 33.

With reference to Fig. 2, the battery pack 71 and relay 83 are mounted within a channel typically formed on the underside of the scooter's base platform 3. After the battery pack 71 and relay 83 are mounted to the scooter's underside using typical fasteners known to those skilled in the art such as glue or Velcro, the battery cover 73 is also attached to the underside of the scooter's base platform 3 using Velcro or the like to protect the battery pack 71 and relay 83 from damage during riding. As shown in Fig. 2, the battery pack 71 is connected to the relay 83 and in-turn to the motor 59 through high current wires 84 and connectors 79 and 81.

The control circuit 85 is installed on the scooter 1 by routing signal wire 89 through battery cover 73 to the front of the scooter's base platform 3 and then upwardly

along the side of the scooter's head tube 15. Preferably, the wire 89 is affixed in place using adhesive backed tie bases 101 and cable ties 103. With reference to Figs. 1, 2 and 8, the contact strip 91 is affixed in annular fashion to the top of the head tube 15 using double stick tape or the like to form an electrical ring on the head tube's upper exterior surface. Meanwhile, the collar 105 is affixed to the lower extremity of the rotable steering column 7 so that the lower portion of the collar extends concentrically around the contact strip 91. Attached to the interior of the collar 105 is the contact bar 95 which is positioned to slidably contact the side of the contact strip 91 as the steering column 7 and collar 105 are rotated. The single wire extending from the contact bar 95 is routed upwardly along the length of the steering column 7, and preferably is coiled along the steering column's upper tube 9 so that the upper tube 9 may still telescopically extend and retract within the steering column's lower tube 11. The on/off button 99 is then affixed to the handlebars 5 using bracketry or tie wraps as could be constructed by those skilled in the art.

The on/off button 99 is preferably constructed so that depression of the button causes a current to flow through the switch, with the removal of pressure from the on/off button 99 causing the circuit to open. As would be understood by those skilled in the art, the signal wires 89 and 97, in cooperation with contact strip 91, in rotational contact with contact bar 95 provide a first electrical path to the on/off button 99 from the relay 83. Providing a second electrical path from the on/off button 99 to the relay 83 is the frame of the scooter 1 itself. To this end, the handlebars 5, steering column 7, bearings 17, head tube 15, hinge assembly 21 and base platform 3 are all constructed of electrically

conductive metal such as stainless steel. One of the terminals of the on/off button 99 is electrically connected directly to the underside of the platform base 3. Thus, depression of on/off button 99 causes a circuit to close through signal wire 89, contact strip 91, contact bar 95, signal wire 97, handlebars 5, steering column 7, bearings 17, head tube 15, hinge assembly 21 and base platform 3 causing the relay 83 to close, permitting current to flow from battery pack 71 to the motor 59.

Once the components of the kit 51 have been installed on the scooter 1, a motorized scooter is thus provided. Depressing the on/off button 99 energizes the motor 59 causing the rear wheel 33 to rotate. Braking is provided by depressing the fender foot break against the rear wheel 33.

Preferred embodiment is complete kit Fig. 14 and Fig. 15 ready for consumer purchase which includes Fig. 14, battery charger 150, twelve volt adapter 151, spring installer 152, pin installer 153 and Fig. 15, butterfly motor bracket 154 and all necessary wiring and relay installations.

Although the present invention has described with reference to the preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.